

This listing of claims will replace all prior versions, and listings, of claims in the application:

**Listing of Claims:**

1.-24. (Canceled).

25. (Previously Presented) An anode effluent control method for a fuel cell power plant comprising a fuel cell stack which performs power generation using anode gas having hydrogen as a main component, the anode gas being discharged from the fuel cell stack as anode effluent following a power generation reaction, a return passage which recirculates the anode effluent into the anode gas, and a purge valve which discharges the anode effluent in the return passage to the outside of the passage, the control method comprising:

calculating a first energy loss caused by an increase in a non-hydrogen component in the anode gas while the purge valve is closed;

calculating a second energy loss which corresponds to an amount of hydrogen lost from the anode gas when the purge valve is opened;

maintaining the purge valve in a closed state when the second energy loss is larger than the first energy loss; and

opening the purge valve when the second energy loss equals or falls below the first energy loss.

26. (Previously Presented) The anode effluent control method as defined in Claim 25, wherein the non-hydrogen component includes nitrogen and water vapor.

27. (Previously Presented) The anode effluent control method as defined in Claim 26, wherein the control method further comprises:

calculating a nitrogen partial pressure of the anode gas in accordance with a duration of the closed state of the purge valve;

determining a temperature of the fuel cell stack;

calculating a water vapor partial pressure of the anode gas on the basis of the temperature of the fuel cell stack;

calculating a hydrogen partial pressure of the anode gas by subtracting the nitrogen partial pressure and the water vapor partial pressure from an anode gas pressure; and

calculating the first energy loss on the basis of variation in the hydrogen partial pressure.

28. (Previously Presented) The anode effluent control method as defined in Claim 27, wherein the fuel cell stack comprises an anode which is exposed to the anode gas, a cathode, and an electrolyte membrane disposed between the anode and the cathode, the fuel cell power plant further comprises an air supply device which supplies air to the cathode, and the control method further comprises calculating the nitrogen partial pressure of the anode gas on the basis of an amount of nitrogen in the anode gas which increases as nitrogen in the air permeates the electrolyte membrane from the cathode so as to reach the anode.

29. (Previously Presented) The anode effluent control method as defined in Claim 27, wherein the fuel cell power plant further comprises an anode gas passage which supplies the anode gas to the fuel cell stack, a hydrogen supply device which supplies hydrogen to the anode gas passage, a catalyst which oxidizes carbon monoxide in the anode effluent in the return passage, and an air supply device which supplies air for oxidizing the carbon monoxide to the return passage, and the control method further comprises calculating an accumulated amount of the carbon monoxide in the anode gas that was contained in the hydrogen supplied to the anode gas passage from the hydrogen supply device, comparing the accumulated amount to a predetermined value, and supplying air to the return passage from the air supply device when the accumulated amount is larger than the predetermined value.

30. (Previously Presented) The anode effluent control method as defined in Claim 29, wherein the control method further comprises preventing the air supply device from supplying air to the return passage when the purge valve is open.

31. (Previously Presented) The anode effluent control method as defined in Claim 29, wherein the fuel cell power plant further comprises a pump for pressurizing the anode effluent in the return passage so as to introduce the anode effluent into the anode gas passage, and the control method further comprises reducing the rotation speed of the pump when air is supplied to the return passage from the air supply device.

32. (Previously Presented) The anode effluent control method as defined in Claim 29, wherein the control method further comprises calculating a partial pressure of carbon dioxide that is mixed into the anode gas as a result of a carbon monoxide oxidation operation performed by the catalyst, correcting the nitrogen partial pressure of the anode gas on the basis of an amount of air supplied to the return passage, and calculating the hydrogen partial pressure by subtracting the water vapor partial pressure, the carbon dioxide partial pressure, and a corrected nitrogen partial pressure from the anode gas pressure.

33. (Previously Presented) The anode effluent control method as defined in Claim 29, wherein the fuel cell power plant further comprises a recording device which pre-records a carbon monoxide content of the hydrogen that is supplied by the hydrogen supply device, and the control method further comprises calculating the accumulated amount of carbon monoxide in the anode gas on the basis of the carbon monoxide content recorded in the recording device.

34. (Previously Presented) The anode effluent control method as defined in Claim 27, wherein the control method further comprises calculating the nitrogen partial pressure of the anode gas as a value which increases as a duration of the closed state of the purge valve lengthens.

35. (Previously Presented) The anode effluent control method as defined in Claim 27, wherein the control method further comprises calculating the water vapor partial pressure of the anode gas as a value which increases as a temperature of the fuel cell stack rises.

36. (Previously Presented) The anode effluent control method as defined in Claim 25, wherein the control method further comprises calculating the second energy loss as a value which decreases in accordance with a duration of the closed state of the purge valve.

37. (Previously Presented) An anode effluent control device for a fuel cell stack which performs power generation using anode gas having hydrogen as a main component, the anode gas being discharged from the fuel cell stack as anode effluent following a power generation reaction, the device comprising:

- a return passage which re-circulates the anode effluent into the anode gas;
- a purge valve which discharges the anode effluent in the return passage to the outside of the passage; and
- a programmable controller programmed to:
  - calculate a first energy loss caused by an increase in a non-hydrogen component in the anode gas while the purge valve is closed;
  - calculate a second energy loss which corresponds to an amount of hydrogen lost from the anode gas when the purge valve is opened;
  - maintain the purge valve in a closed state when the second energy loss is larger than the first energy loss; and
  - open the purge valve when the second energy loss equals or falls below the first energy loss.

38. (Previously Presented) The anode effluent control device as defined in Claim 37, wherein the non-hydrogen component includes nitrogen and water vapor.

39. (Previously Presented) The anode effluent control device as defined in Claim 38, wherein the controller is further programmed to:

- calculate a nitrogen partial pressure of the anode gas in accordance with a duration of the closed state of the purge valve;
- determine a temperature of the fuel cell stack;
- calculate a water vapor partial pressure of the anode gas on the basis of the temperature of the fuel cell stack;
- calculate a hydrogen partial pressure of the anode gas by subtracting the nitrogen partial pressure and the water vapor partial pressure from an anode gas pressure; and
- calculate the first energy loss on the basis of variation in the hydrogen partial pressure.

40. (Previously Presented) The anode effluent control device as defined in Claim 39, wherein the fuel cell stack comprises an anode which is exposed to the anode gas, a cathode, and an electrolyte membrane disposed between the anode and the cathode, the device further comprises an air supply device which supplies air to the cathode, and the controller is further programmed to calculate the nitrogen partial pressure of the anode gas on the basis of an amount of nitrogen in the anode gas which increases as nitrogen in the air permeates the electrolyte membrane from the cathode so as to reach the anode.

41. (Previously Presented) The anode effluent control device as defined in Claim 39, wherein the device further comprises an anode gas passage which supplies the anode gas to the fuel cell stack, a hydrogen supply device which supplies hydrogen to the anode gas passage, a catalyst which oxidizes carbon monoxide in the anode effluent in the return passage, and an air supply device which supplies air for oxidizing the carbon monoxide to the return passage, and the controller is further programmed to calculate an accumulated amount of the carbon monoxide in the anode gas that was contained in the hydrogen supplied to the anode gas passage from the hydrogen supply device, compare the accumulated amount to a predetermined value, and supply air to the return passage from the air supply device when the accumulated amount is larger than the predetermined value.

42. (Previously Presented) The anode effluent control device as defined in Claim 41, wherein the controller is further programmed to prevent the air supply device from supplying air to the return passage when the purge valve is open.

43. (Previously Presented) The anode effluent control device as defined in Claim 41, wherein the device further comprises a pump for pressurizing the anode effluent in the return passage so as to introduce the anode effluent into the anode gas passage, and the controller is further programmed to reduce the rotation speed of the pump when air is supplied to the return passage from the air supply device.

44. (Previously Presented) The anode effluent control device as defined in Claim 41, wherein the controller is further programmed to calculate a partial pressure of

carbon dioxide that is mixed into the anode gas as a result of a carbon monoxide oxidation operation performed by the catalyst, correct the nitrogen partial pressure of the anode gas on the basis of an amount of air supplied to the return passage, and calculate the hydrogen partial pressure by subtracting the water vapor partial pressure, the carbon dioxide partial pressure, and a corrected nitrogen partial pressure from the anode gas pressure.

45. (Previously Presented) The anode effluent control device as defined in Claim 41, wherein the device further comprises a recording device which pre-records a carbon monoxide content of the hydrogen that is supplied by the hydrogen supply device, and the controller is further programmed to calculate the accumulated amount of carbon monoxide in the anode gas on the basis of the carbon monoxide content recorded in the recording device.

46. (Previously Presented) The anode effluent control device as defined in 39, wherein the controller is further programmed to calculate the nitrogen partial pressure of the anode gas as a value which increases as a duration of the closed state of the purge valve lengthens.

47. (Previously Presented) The anode effluent control device as defined in Claim 39, wherein the controller is further programmed to calculate the water vapor partial pressure of the anode gas as a value which increases as a temperature of the fuel cell stack rises.

48. (Previously Presented) The anode effluent control device as defined in Claim 37, wherein the controller is further programmed to calculate the second energy loss as a value which decreases in accordance with a duration of the closed state of the purge valve.

49. (Previously Presented) An anode effluent control device for a fuel cell stack which performs power generation using anode gas having hydrogen as a main component, the anode gas being discharged from the fuel cell stack as anode effluent following a power generation reaction, the device comprising:

a return passage which re-circulates the anode effluent into the anode gas;

a purge valve which discharges the anode effluent in the return passage to the outside of the passage;

means for calculating a first energy loss caused by an increase in a non-hydrogen component in the anode gas while the purge valve is closed;

means for calculating a second energy loss which corresponds to an amount of hydrogen lost from the anode gas when the purge valve is opened;

means for maintaining the purge valve in a closed state when the second energy loss is larger than the first energy loss; and

means for opening the purge valve when the second energy loss equals or falls below the first energy loss.